

Ten new species of the genus *Cybaeus* (Araneae: Cybaeidae) from central Honshu, Japan.

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Abstract — A total of ten spiders of the genus *Cybaeus* (Araneae: Cybaeidae) are described from the central part of Honshu, Japan, as new: *Cybaeus ensu* (southwestern part of Shizuoka Pref. and vicinities), *C. kiiensis* (Kii Peninsula), *C. minoensis* (western part of Gifu Pref. and vicinities), *C. biwaensis* (areas adjacent to northern part of Lake Biwa), *C. echigo* (northernmost part of Nagano Pref., Niigata and Fukushima Pref.), *C. aizuensis* (Fukushima and Niigata Pref.), *C. gassan* (Yamagata Pref.), *C. asahi* (Mt. Asahi in Yamagata Pref.), *C. melanoparvus* (Fukui, Gifu, and Nagano Pref.), and *C. monticolus* (southern mountainous area of Chubu District). Each of the species seems to occupy a relatively small local area as shown in the parentheses above, though some of those distributional ranges largely or partially overlap one another.

Key words — *Cybaeus*, new species, Araneae, Cybaeidae, Japan

Introduction

The genus *Cybaeus*, which is the largest in the family Cybaeidae (Araneae), consists of more than a hundred and twenty species in the world (Platnick 2006). The genus seems to show the highest species diversity in Japanese Islands and about a half of the species described in the genus are endemic to the areas.

Spiders of the genus are usually soil dwellers and are found in soil litter, under stones or logs on the forest floor. Quite a few species of the genus are cave dwellers and more than 20 species have been described from limestone or lava caves in Japan (Yaginuma, 1963, 1972; Komatsu, 1968; Irie 1998; Irie and Ono 2000, 2001, 2002). However, only a few species had been described for the soil (Uyemura 1938 etc.). Ihara eagerly has surveyed mainly soil dwelling species and has described many species from Chugoku and Shikoku Districts (Ihara 1993, 1994, 2003, 2004), Kyushu (Ihara 2003), and Tohoku District (Ihara 2004), presenting detailed information on their distributions. However, spiders of the genus have not been extensively explored in the central part of Honshu and many species still remain to be undescribed. I have conducted a taxonomic survey of the genus mainly in this area for past several years and found many undescribed species. As the first report of the results, I will describe here ten new species of the genus.

Material and Methods

Collecting. Most of the materials were collected by using an aspirator under fallen leaves and stones in forests. Immediately after collecting, specimens were fixed in 70% ethanol and preserved in glass bottles filled with new 70%

ethanol solution. In addition to specimens collected by myself, many specimens collected by Mr. H. Kobayashi by the same method as above were used in this research. Collecting sites of each species are shown in Fig. 1.

Observation. Body color, arrangement of eyes, color and annulations of legs, and spination (numbers and positions) on tibia and metatarsus of 1st and 2nd legs were directly observed under a binocular microscope. Positions of the spines were recorded according to the system by Komatsu (1968). Left male palp was removed for a male of each species to fully observe existence and shape of apophysis on the patella, numbers and positions of teeth on the patellar apophysis, and apical part of the bulb under binocular microscope. Female genitalia were dissected and treated with KOH and H₂O₂ by a method slightly modified from Komatsu & Yaginuma (1968). Size, shape, arrangement and numbers of spermathecae, and length, shape and numbers of connecting ducts were particularly observed in detail. This paper defines spermatheca proximal to the opening as the 1st spermatheca and distal spermatheca connected by a duct from 1st spermatheca as 2nd spermatheca.

Measurements. Body parts of both sexes (holotype and a paratype) were measured using a micrometer under the binocular microscope. All the measurements are in mm.

Depository. The type specimens of the new species described in this paper are deposited in the collection of the Department of Zoology, National Science Museum, Tokyo (NSMT).

Abbreviations. Following abbreviations are used partly after the usage of Komatsu (1968). Body parts: L, length; W, width. Eye: AME, anterior median eye; ALE, anterior lateral eye; PLE, posterior lateral eye; PME, posterior

median eye. Leg: PLS, prolateral spine; PVS, proventral spine; RVS, retroventral spine; VS, ventral spine. Genitalia: m SPM, m pair (s) of spermatheca (e); n CD, n pair (s) of connecting duct (s) (m, n: numbers). Collectors: HK, Hisatoshi Kobayashi; TK, Toshiki Kobayashi.

Results

Cybaeus ensu sp. nov.

[Japanese name: Enshu-namihagumo]
(Figs. 1–7)

Type material. Holotype (♂) AICHI PREF. Kitashitara-gun, Tōei-cho, Mt. Myōjin, 19-I-1997, HK. Paratype (♀) AICHI PREF. Okazaki City, Ishihara, 7-XII-1996, HK.

Other specimens examined. SHIZUOKA PREF. Shizuoka City: Kamiochiai, 1♀, 19-V-2001, HK; Kyuno, 5♂4♀, 30-X-1977, HK. Fujieda City, Takinoya, 1♂8♀, 26-XII-1998, HK. Haibara-gun, Kawane-cho, Sasama, 1♀, 8-V-1977, HK. Kakegawa City, Kuromata, 5♂2♀, 23-XII-1994, HK. Fukuroi City, Mt. Ogasa, 1♂2♀, 16-I-1995, HK. Hamamatsu City: Matsuma, 1♂, 1-II-1997, HK; Haruno-cho, Mt. Akiha, 1♂, 15-V-1994, HK; Shimoda, 2♂1♀, 10-I-1998, HK; Sakuma-cho, Yoshizawa, 1♂3♀, 18-II-1995, HK; Inasa-cho, Mt. Kannon, 1♀, 19-II-1995, HK. —AICHI PREF. Kitashitara-gun, Tōei-cho: Ōkubo, 2♂2♀, 30-XI-1997, HK; Mt. Kurakake, 1♂1♀, 11-XII-1999, HK; Nishisonome, 1♂, 15-I-1997, HK; Mt. Myōjin, 2♂1♀, 19-I-1997, HK. Shinshiro City: Mt. Hōraiiji, 1♂1♀, 26-XI-1994, HK; Hōraiiji Lake, 4♂2♀, 8-II-1997, HK; Makihara, 1♂1♀, 8-I-2000, HK. Okazaki City, Ishihara, 5♂, 7-XII-1996, HK.

Diagnosis. *Cybaeus ensu* sp. nov. is distinguished from most of the congeners already known in having 2SPM and 1CD on female genitalia (most species of *Cybaeus* possess the genitalia comprized of 3SPM and 2CD). The present new species is similar to *C. nojimai* Ihara 1993 and *C. hirosshimaensis* Ihara 1993 in body color and length, existence of a patellar apophysis in male palp and components in female genitalia. The present new species, however, differs from the latter two species in shape (Fig. 4 for *C. ensu* vs. fig. 19, p. 124, Ihara 1993 for *C. nojimai*; fig. 3, p. 117, Ihara 1993 for *C. hirosshimaensis*) and teeth numbers (3 for *C. ensu* vs. 0 for *C. nojimai* and *C. hirosshimaensis*) of patellar apophysis in male palp, and arrangement of spermarhecae and shape of connecting duct (Fig. 7 for *C. ensu* vs. fig. 22, p. 124, Ihara 1993 for *C. nojimai*; fig. 7, p. 117, Ihara 1993 for *C. hirosshimaensis*) in female genitalia.

Measurements of the male holotype and female paratype in parentheses. Body L 2.95 (2.88); carapace L 1.50 (1.48), W 1.08 (0.95); abdomen L 1.45 (1.40), W 1.23 (1.08); sternum L 0.73 (0.73), W 0.70 (0.70); labium L 0.17 (0.17), W 0.25 (0.26). Eyes: diameters AME 0.03 (0.03), ALE 0.09 (0.09), PLE 0.08 (0.07), PME 0.08 (0.07); intervals AME-AME 0.02 (0.02), AME-ALE 0.03 (0.03), ALE-PLE 0.03 (0.04), PLE-PME 0.05 (0.06), PME-PME 0.07 (0.09); clypeus 0.16 (0.16). length of legs [total length (femur +

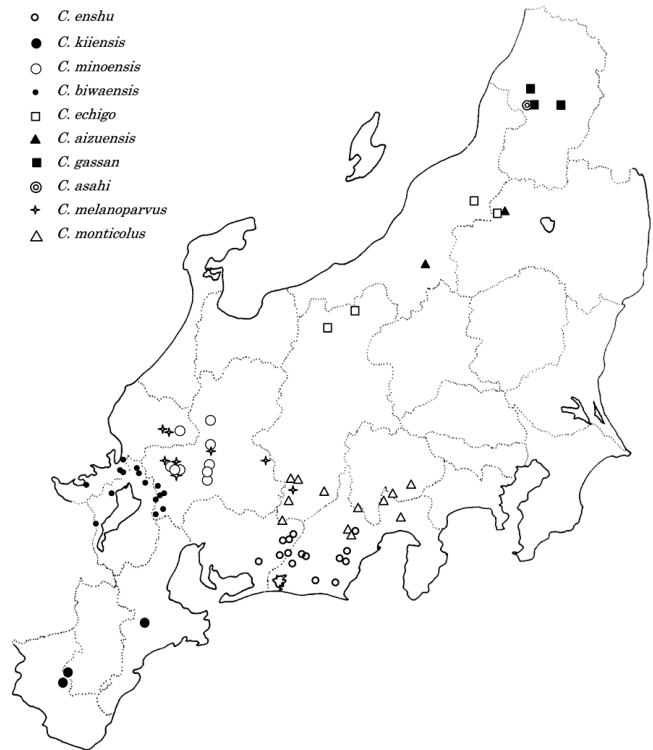
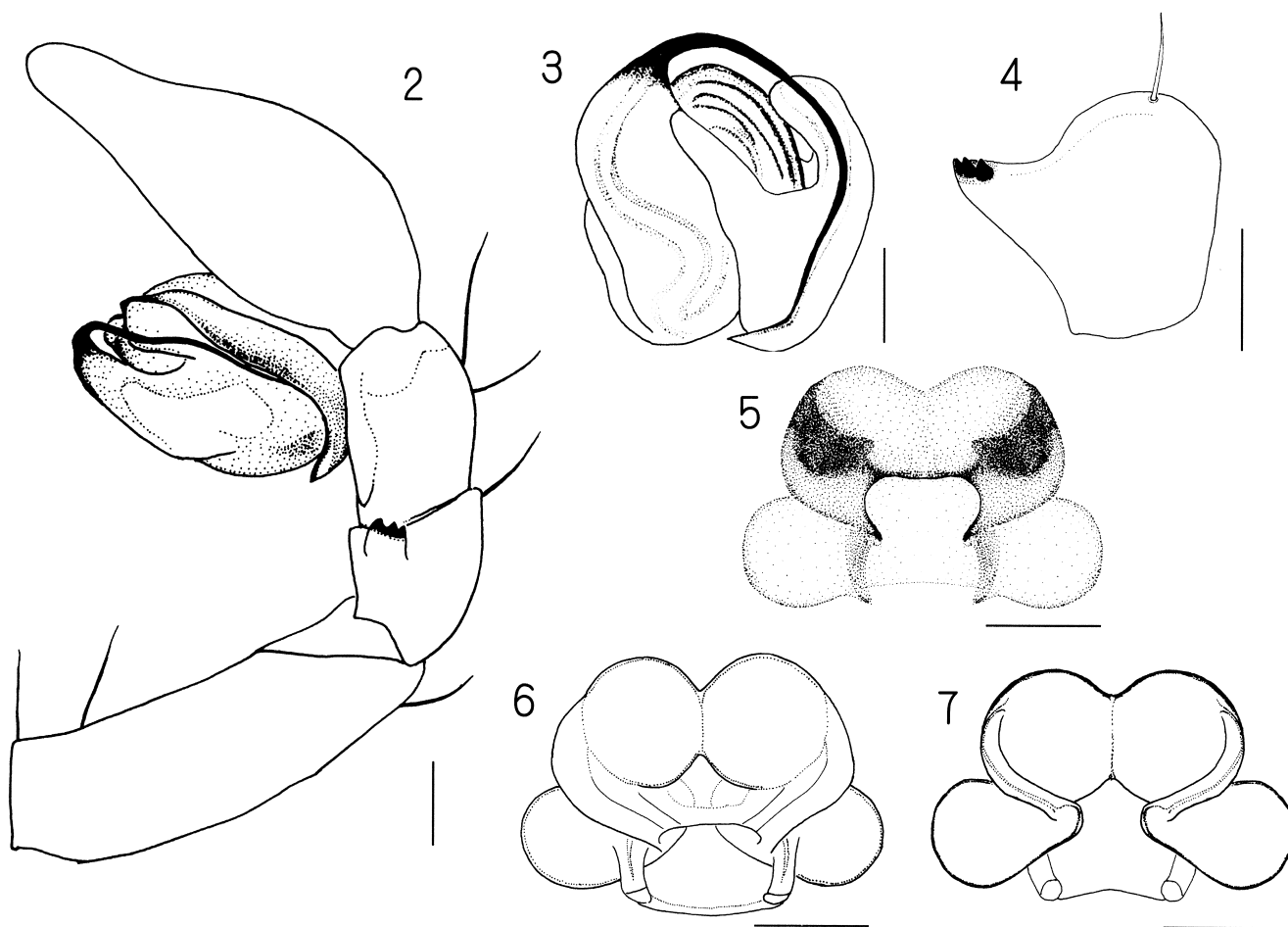


Fig. 1 Distribution of ten new species of *Cybaeus* in Central Japan.

patella + tibia + metatarsus + tarsus): ♂I 3.89 (1.08 + 0.45 + 1.03 + 0.75 + 0.59)/II 3.53 (0.98 + 0.43 + 0.88 + 0.73 + 0.53)/III 3.28 (0.88 + 0.38 + 0.90 + 0.68 + 0.45)/IV 4.26 (1.08 + 0.66 + 0.98 + 0.98 + 0.58); ♀I 3.58 (1.03 + 0.45 + 0.93 + 0.70 + 0.48)/II 3.31 (0.95 + 0.43 + 0.80 + 0.68 + 0.46)/III 2.75 (0.80 + 0.38 + 0.63 + 0.63 + 0.33)/IV 3.70 (0.98 + 0.40 + 0.90 + 0.90 + 0.53).

Description. *Male (Holotype).* Carapace light reddish brown with black cervical flecks, longer than wide (W/L 0.7). Anterior eye row weakly procurved as seen from front. Posterior eye row almost straight as seen from above. AME smallest, one third the diameter of ALE. ALE largest, slightly larger than posterior eyes. AME-AME shorter than AME-ALE, AME-AME/AME-ALE \approx 0.7. PME-PME longer than PLE-PME, PME-PME/PLE-PME \approx 1.4. Ocular area wider than long (W/L 2.0), narrower in front than behind (behind/front 2.7). Clypeus longer than length of ocular area (clypeus/ocular area L 1.3). Chelicera reddish brown, promargin of fang furrow with three teeth, retromargin with two teeth and some (right, five; left, four) denticles. Labium reddish brown, wider than long (W/L 1.6), about half as long as maxilla. Sternum light reddish brown, slightly longer than wide, truncated in front, pointed between coxae IV. Legs light reddish brown, becoming deep brown towards the distal end and with no annulations. Leg length 4 > 1 > 2 > 3. Tibia I with 3PVS (1–3), 2PLS (3, 4), 2RVS (1, 2). Tibia II with 2PVS (1, 2), 2PLS (2, 3), 3RVS (1–3). Metatarsus I with 3PVS (1–3), 1PLS (2), 3RVS (1–3). Metatarsus II with 4PVS (1–3, between 1 and 2), 3PLS (2–



Figs. 2–7 *Cybaeus enschu* sp. nov. (2–4, male holotype; 5–7, female paratype) 2–4, Left male palp: 2, retrolateral view; 3, apical part of the bulb, ventral view; 4, patella, dorsal view. 5, Female epigynum. 6–7, Female internal genitalia: 6, ventral view; 7, dorsal view. (Scales: 0.1 mm)

4), 3RVS (1–3) and VS. Abdomen ivory with no flecks, oval, longer than wide.

Palp (Figs. 2–4): Proportion of each segment to patellar length [femur: patella: tibia: cymbium] = 2.56:1:1.11:2.11. Patella with a thumb-like apophysis. Patellar apophysis with three teeth. Tip of patellar apophysis black.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 5.

Internal genitalia (Figs. 6–7): 2SPM and 1CD present. Opening, large, equilateral trapezoid. Spermathecae large and balloon-shaped. 1st spermatheca larger than 2nd spermatheca. Connecting duct long and thin, emanating from lateral side of 1st spermatheca, curved from inside to dorsal side, and connecting to centro-lateral side of 2nd spermatheca.

Distribution. From central part of Shizuoka Pref. to eastern part of Aichi Pref. (Fig. 1).

Etymology. The specific name is derived from Enshu District, which refers to western part of Shizuoka Prefecture, where the species resides.

***Cybaeus kiiensis* sp. nov.**

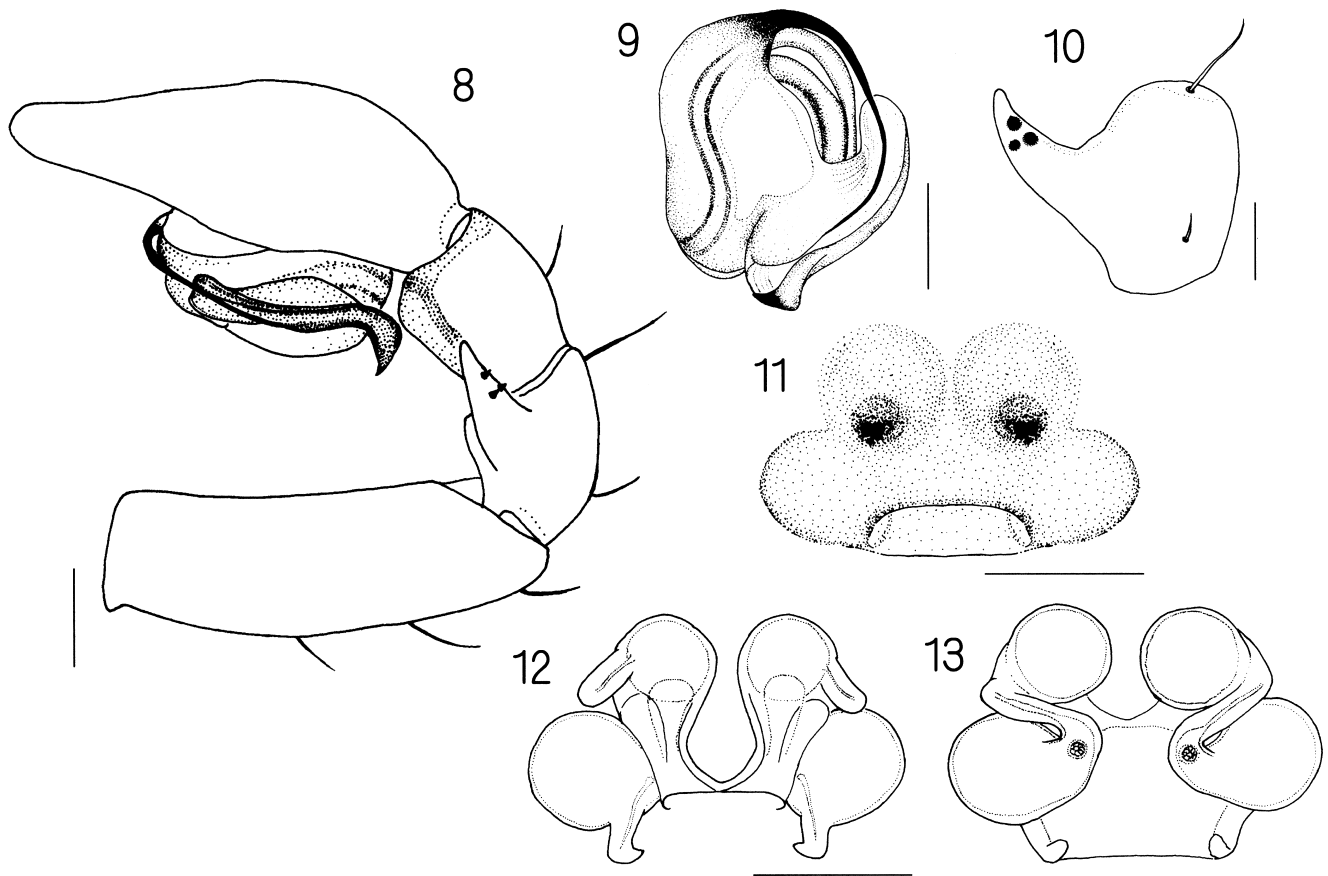
[Japanese name: Kii-namihagumo]

(Figs. 1, 8–13)

Type material. Holotype (♂) and a paratype (♀) MIE PREF. Matsuzaka City, Iidaka-cho, Mori, 31-XII-2001, HK & TK.

Other specimens examined. MIE PREF. Matsuzaka City, Iidaka-cho: Mori, 1♂1♀, 31-XII-2001, HK & TK; Emagoya-keikoku, 1♂3♀, 2-XI-2002, HK. —WAKAYAMA PREF. Tanabe City, Ryujin-mura: Mt. Gomadanzan, 1♂6♀, 30-IV-2005, HK & TK; Nishigakinai, 2♂1♀, 30-IV-2005, HK & TK.

Diagnosis. *Cybaeus kiiensis* sp. nov. can be distinguished from most of the congeners in having 2SPM and 1CD in female genitalia. Females of the present new species extremely resemble *C. enschu* in components and structures of genitalia. Males of the present new species also resemble *C. enschu* in having a patellar apophysis in palp. However, the present new species can be distinguished from the latter by shape of patellar apophysis (Figs. 12–13 for *C. kiiensis* vs. Figs. 6–7 for *C. enschu*) in male palp, and size of



Figs. 8–13 *Cybaeus kiiensis* sp. nov. (8–10, male holotype; 11–13, female paratype) 8–10, Left male palp: 8, retrolateral view; 9, apical part of the bulb, ventral view; 10, patella, dorsal view. 11, Female epigynum. 12–13, Female internal genitalia: 12, ventral view; 13, dorsal view. (Scales: 0.1 mm)

spermathecae (1st \approx 2nd for *C. kiiensis* vs. 1st $>$ 2nd for *C. enshu*) in female genitalia. The present new species also resembles *C. hatsushibai* Ihara 2005 in component and structure of female genitalia. The present new species, however, can be easily distinguished from the latter in body length (σ ca. 2.5, ρ ca. 2.9 for *C. kiiensis* vs. σ ca. 6.8, ρ ca. 7.2 for *C. hatsushibai*), abdominal color (ivory for *C. kiiensis* vs. olive black for *C. hatsushibai*), shape (Fig. 10 for *C. kiiensis* vs. fig. 3-A, p. 105, Ihara 2005 for *C. hatsushibai*) and teeth number (3 for *C. kiiensis* vs. 9 for *C. hatsushibai*) of patellar apophysis in male palp.

Measurements of the male holotype and female paratype in parentheses. Body L 2.48 (2.93); carapace L 1.28 (1.37), W 0.90 (0.96); abdomen L 1.20 (1.57), W 0.88 (1.22); sternum L 0.63 (0.68), W 0.62 (0.67); labium L 0.13 (0.15), W 0.22 (0.25). Eyes: diameters AME 0.04 (0.04), ALE 0.08 (0.09), PLE 0.06 (0.07), PME 0.06 (0.07); intervals AME-AME 0.01 (0.01), AME-ALE 0.02 (0.02), ALE-PLE 0.02 (0.02), PLE-PME 0.04 (0.04), PME-PME 0.06 (0.07); clypeus 0.14 (0.14). Length of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: σ I 3.22 (0.88 + 0.40 + 0.80 + 0.63 + 0.50)/II 3.02 (0.83 + 0.39 + 0.72 + 0.58 + 0.49)/III 2.62 (0.70 + 0.33 + 0.57 + 0.58 + 0.43)/IV 3.30 (0.87 + 0.37 + 0.77 + 0.78 + 0.52); ρ I 3.23 (0.90 + 0.42 + 0.82 +

0.60 + 0.50)/II 2.98 (0.84 + 0.40 + 0.73 + 0.57 + 0.45)/III 2.60 (0.72 + 0.35 + 0.55 + 0.57 + 0.42)/IV 3.37 (0.92 + 0.37 + 0.78 + 0.78 + 0.52).

Description. Male (Holotype). Carapace light reddish brown with black cervical flecks, longer than wide (W/L 0.7). Anterior eye row procurved as seen from front. Posterior eye row almost straight as seen from above. AME smallest and about a half the diameter ALE. ALE largest, larger than posterior eyes. PLE almost equal to PME. AME-AME shorter than AME-ALE, AME-AME/AME-ALE \approx 0.7. PME-PME longer than PLE-PME, PME-PME/PLE-PME \approx 1.8. Ocular area as long as wide, narrower in front than behind (behind/front 2.0). Clypeus almost equal to the length of ocular area (clypeus/ocular area L 1.1). Chelicera light reddish brown, promargin of fang furrow with three teeth, retromargin with three teeth and four denticles. Labium light reddish brown, wider than long (W/L 1.6), about half as long as maxilla. Sternum light reddish brown, longer than wide, truncated in front, pointed between coxae IV. Legs light reddish brown with no annulations, becoming deep brown towards the distal end. Leg length 4 $>$ 1 $>$ 2 $>$ 3. Tibia I with 3PVS (1–3), 2PLS (3, 4), 4RVS (1–4). Tibia II with 2PVS (1, 2), 2PLS (2, 3), 3RVS (1–3). Metatarsus I with 3PVS (1–3), 1PLS (2), 3RVS (1–3) and VS. Metatarsus

II with 3PVS (1–3), 2PLS (2, 4), 3RVS (1–3) and VS. Abdomen ivory with no flecks, oval, longer than wide.

Palp (Figs. 8–10): Proportion of each segment to patellar length [femur: patella: tibia: cymbium]=2.25:1:1:2.34. Patella with a horn-like apophysis. Patellar apophysis with three teeth on dorsal side. Tip of patellar apophysis sharp-pointed.

Female (Paratype). Legs slightly shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 11.

Internal genitalia (Figs. 12–13): 2SPM and 1CD present. Opening ellipse. Spermathecae spherical. 1st spermatheca slightly smaller than 2nd spermatheca. Connecting duct long and narrow, emanating from lateral side of 1st spermatheca, curving inside to dorsal, and connecting to centro-lateral side of 2nd spermatheca in dorsal side.

Distribution. The Kii Mountains (Mie and Wakayama Prefectures) (Fig. 1).

Etymology. The specific name is derived from the Kii Peninsula, where the species were found.

***Cybaeus minoensis* sp. nov.**

[Japanese name: Mino-namihagumo]

(Figs. 1, 14–20)

Type material. Holotype (♂), GIFU PREF. Motosu City, Neo-okudani, 4-XI-2001, HK. Paratype (♀) GIFU PREF. Mino City, Mitarai, 21-XI-1998, HK.

Other specimens examined. FUKUI PREF. Ôno City, S himoôno, 5♂7♀, 23-IX-2005, HK & TK. —GIFU PREF. Takayama City, Shokawa-cho, Akadani, 9♀, 21-V-2005, HK & TK. Gujô City: Hachiman-cho, Kajika, 7♀, 8-V-1999, HK; Minami-cho, Mt. Fukubegatake, 2♂4♀, 26-IX-1998, HK. Mino City: Nakamichi, 4♀, 21-XI-1998, HK; Otagari, 1♂5♀, 21-XI-1998, HK. Yamagata City, Tajima, 1♀, 18-XI-2000, HK. Motosu City: Neo-okudani, 2♂, 4-XI-2001, HK; Neo-matsuda, 3♀, 25-XI-2000, HK; Neo-nogo, 4♂3♀, 27-X-2001, HK.

Diagnosis. *Cybaeus minoensis* sp. nov. is easily distinguished from other species of *Cybaeus* by having female epigynum with a scape. The present new species and *C. nojimai* are similar to one another in body color and length, having a patellar apophysis in male palp and J's structures formed by a connecting duct and 2nd spermatheca in female genitalia. The two species, however, differ from each other in shape (Fig. 16 for *C. minoensis* vs. fig. 19, p. 124, Ihara 1993 for *C. nojimai*) and teeth numbers (4 for *C. minoensis* vs. 0 for *C. nojimai*) of patellar apophysis in male palp, and size of spermathecae (1st<<2nd for *C. minoensis* vs. 1st≈2nd for *C. nojimai*) and shape of 2nd spermatheca (Fig. 19 for *C. minoensis* vs. fig. 22, p. 124, Ihara 1993 for *C. nojimai*) in female genitalia. The present new species resembles *C. itsukiensis* Irie 1998 in having a patellar apophysis in male palp, and J's structure in female genitalia, but differs from the latter in body length (♂ ca. 2.8, ♀ ca. 3.0 for *C. minoensis* vs. ♂ ca. 3.6, ♀ ca. 4.3 for *C. itsukiensis*),

existence of eyes (present in *C. minoensis* vs. absent in *C. itsukiensis*), shape and teeth numbers (4 for *C. minoensis* vs. 2 for *C. itsukiensis*) of patellar apophysis in male palp, and size of spermathecae (1st<<2nd for *C. minoensis* vs. 1st≈2nd for *C. itsukiensis*) in female genitalia.

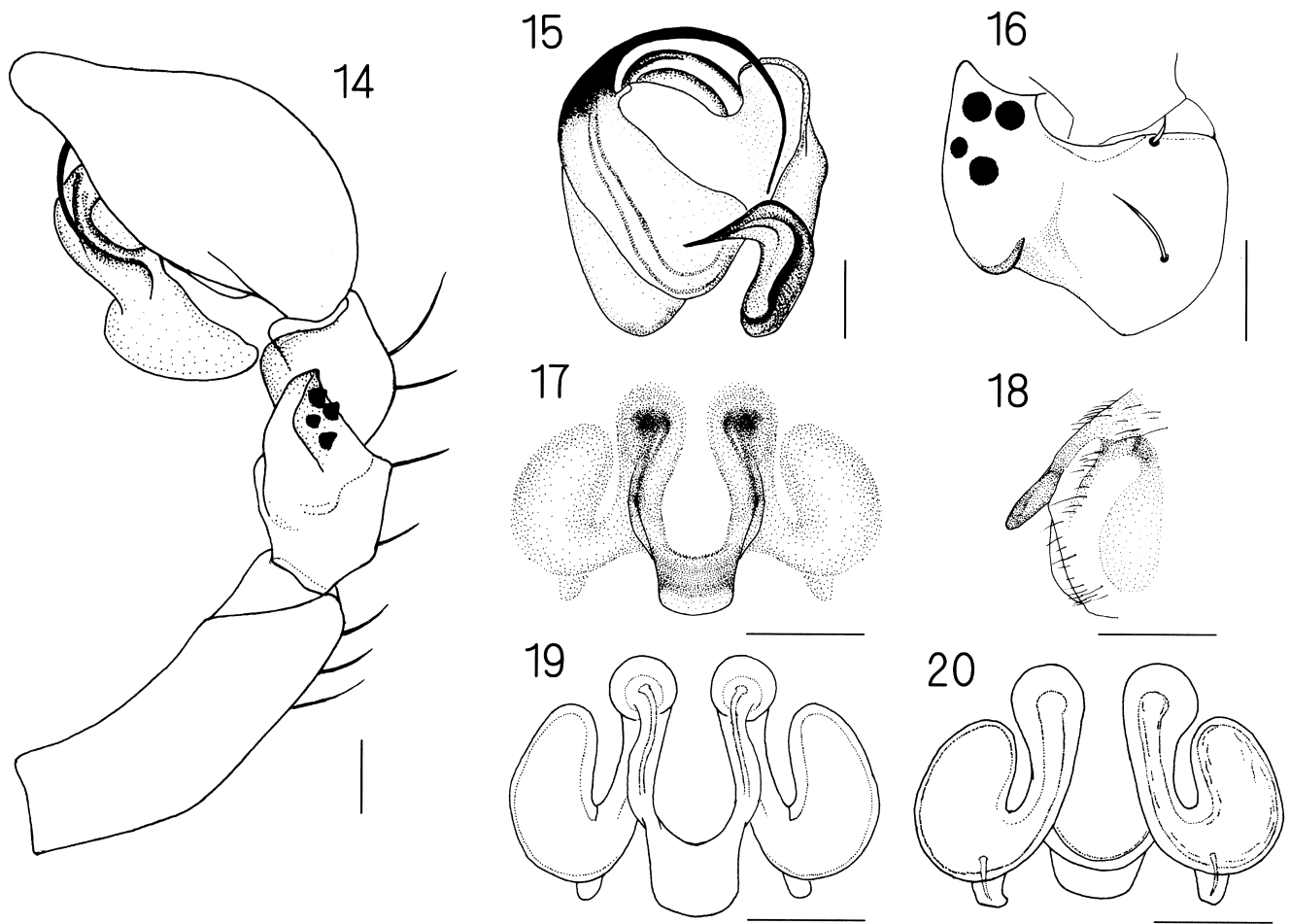
Measurements of the male holotype and female paratype in parentheses. Body L 2.78 (2.98); carapace L 1.48 (1.48), W 1.09 (1.03); abdomen L 1.30 (1.50), W 1.03 (1.18); sternum L 0.68 (0.70), W 0.73 (0.75); labium L 0.15 (0.18), W 0.23 (0.24). Eyes: diameters AME 0.04 (0.04), ALE 0.09 (0.09), PLE 0.09 (0.09), PME 0.07 (0.08); intervals AME-AME 0.02 (0.03), AME-ALE 0.02 (0.03), ALE-PLE 0.03 (0.04), PLE-PME 0.05 (0.06), PME-PME 0.06 (0.09); clypeus 0.17(0.17). Length of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: ♂ I 3.63 (1.00+0.43+0.95+0.73+0.53)/II 3.29(0.91+0.43+0.80+0.65+0.50)/III 2.90 (0.80+0.38+0.63+0.63+0.48)/IV 3.61 (0.96+0.40+0.88+0.85+0.53); ♀ I 3.48(0.98+0.45+0.90+0.65+0.50)/II 3.16 (0.91+0.41+0.75+0.63+0.46)/III 2.76 (0.78+0.38+0.56+0.60+0.45)/IV 3.56(0.93+0.40+0.86+0.85+0.53).

Description. *Male (Holotype).* Carapace reddish brown with black cervical flecks, longer than wide (W/L 0.8). Anterior eye row procurved as seen from front. Posterior eye row almost straight as seen from above. AME smallest, about a half the diameter of ALE. ALE largest, equal to PLE. AME-AME as long as AME-ALE, AME-AME/AME-ALE≈1.0. PME-PME longer than PLE-PME, PME-PME/PLE-PME≈1.1. Ocular area wider than long (W/L 1.7), narrower in front than behind (behind/front 2.1). Clypeus longer than length of ocular area (clypeus/ocular area L 1.3). Chelicera reddish brown, promargin of fang furrow with three teeth, retromargin with three teeth and some (right, four; left, three) denticles. Labium reddish brown, wider than long (W/L 1.6), about half as long as maxilla. Sternum reddish brown, wider than long and swollen, truncated in front, pointed between coxae IV. Legs reddish brown with no annulations. Leg length 1>4>2>3. Tibia I with 3PVS (1–3), 2PLS (3, 4), 3RVS (1–3). Tibia II with 2PLS (2, 3), 2RVS (1, 2). Metatarsus I with 3PVS (1–3), 1PLS (2), 3RVS (1–3). Metatarsus II with 3PVS (1–3), 2PLS (2, 4), 3RVS (1–3) and VS. Abdomen gray with no flecks, oval, longer than wide.

Palp (Figs. 14–16): Proportion of each segment to patellar length [femur: patella: tibia: cymbium]=2.75:1:0.94:2.75. Patella with an arrowhead-like apophysis. Patellar apophysis with four teeth in dorsal side. Four teeth arranging diamond-wise.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Figs. 17 and 18, overhanging from abdomen with a tongue-like scape.

Internal genitalia (Figs. 19–20): 2SPM and 1CD present. Anterior duct almost straight, connecting to 1st spermatheca in ventral side. 1st spermatheca small. Connecting duct thick, emanating from lower side of 1st spermatheca to



Figs. 14–20 *Cybaeus minoensis* sp. nov. (14–16, male holotype; 17–20, female paratype) 14–16, Left male palp: 14, retrolateral view; 15, apical part of the bulb, ventral view; 16, patella, dorsal view. 17–18, Female epigynum: 17, ventral view; 18, lateral view. 19–20, Female internal genitalia: 19, ventral view; 20, dorsal view. (Scales: 0.1 mm)

centro-lateral side of 2nd spermatheca. 2nd spermatheca large and balloon-shaped. Connecting duct and 2nd spermatheca forming J-shaped structure.

Distribution. Eastern part of Fukui Pref. and western part of Gifu Pref. (Fig. 1).

Etymology. The specific name is derived from a Japanese local area name, Mino District, which refers to Gifu Prefecture nowadays.

Remarks. Distributional range of *C. minoensis* overlaps with that of *C. melanoparvus* (Fig. 1).

***Cybaeus biwaensis* sp. nov.**

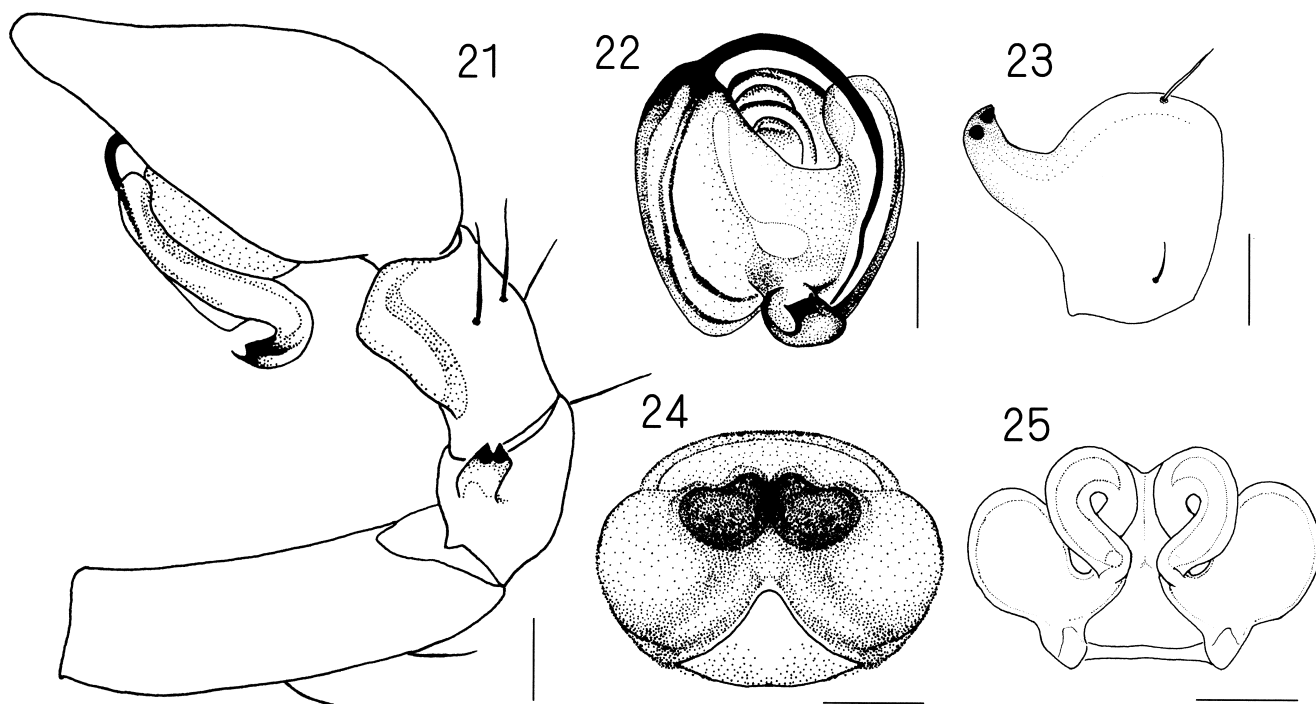
[Japanese name: Biwa-namihagumo]
(Figs. 1, 21–25)

Type material. Holotype (♂) GIFU PREF. Fuwa-gun, Tarui-cho, Ôtaki, 7-II-1998, HK. Paratype (♀) GIFU PREF. Ôgaki City, Kamiishizu-cho, Oku, 8-I-2000, HK.

Other specimens examined. FUKUI PREF. Tsuruga City: Shinpo, 1♂5♀, 22-X-2000, HK; Ogawa, 1♀, 11-XII-2004, HK. Mikatakaminaka-gun, Wakasa-cho, Kôchi, 1♀, 30-III-2002, HK. Obama City, Nishiaioi, 1♂, 21-IV-2002, HK.

—GIFU PREF. Ibi-gun, Ibi-cho, Kasuga, Chôjadaira, 1♂3♀, 7-XI-2004, HK. Fuwa-gun: Tarui-cho, Ôtaki, 4♀, 7-II-1998, HK. Sekigahara-cho, Sekigahara, 2♂, 23-XI-1998, HK. Kozeki, 14♀, 6-IV-1996, HK; Imasu, 3♀, 19-IV-1997, HK. Ôgaki City, Kamiishizu-cho, Tokiyama, 1♀, 25-XI-1995, HK. —SHIGA PREF. Maibara City, Mt. Ibuki, 4♀, 10-V-1997, HK. Ika-gun, Kinomoto-cho: Otowa, 6♀, 3-IV-1999, HK; Kawai, 2♀, 3-IV-1999, HK; Sugino, 5♂4♀, 3-XI-1999, HK. Yogo-cho: Suganami, 3♀, 11-XI-2001, HK; Tochinoki Pass, 1♂1♀, 15-X-2002, HK. Takashima City, Imazu-cho, Sakanami, 1♂, 21-III-2001, HK. Ôtsu City, Nakahira, 3♂7♀, 25-XI-2001, HK.

Diagnosis. *Cybaeus biwaensis* sp. nov. is easily diagnosed by having female genitalia with thick duct-like 1st spermathecae. *C. biwaensis* resembles *C. hirosimaensis* and *C. tsurusakii* Ihara 1993 in body color and length, having a patellar apophysis in male palp and components in female genitalia. But the present new species is distinguishable from the latter by shape (Fig. 23 for *C. biwaensis* vs. fig. 3, p. 117, Ihara 1993 for *C. hirosimaensis*; fig. 15, p. 122, Ihara 1993 for *C. tsurusakii*) and teeth number (2 for *C. biwaensis* vs. 0 for *C. hirosimaensis*; 1 for *C. tsurusakii*)



Figs. 21–25 *Cybaeus biwaensis* sp. nov. (21–23, male holotype; 24–25, female paratype) 21–23, Left male palp: 21, retrolateral view; 22, apical part of the bulb, ventral view; 23, patella, dorsal view. 24, Female epigynum. 25, Female internal genitalia, dorsal view. (Scales: 0.1 mm)

of patellar apophysis in male palp, and shape of 1st spermatheca (Fig. 25 for *C. biwaensis* vs. fig. 7, p. 117, Ihara 1993 for *C. hirosimaensis*; fig. 18, p. 122, Ihara 1993 for *C. tsurusakii*) in female genitalia.

Measurements of the male holotype and female paratype in parentheses. Body L 3.14 (2.88); carapace L 1.64 (1.63), W 1.28 (1.08); abdomen L 1.50 (1.70), W 1.10 (1.33); sternum L 0.75 (0.73), W 0.79 (0.75); labium L 0.16 (0.18), W 0.25 (0.27). Eyes: diameters AME 0.03 (0.04), ALE 0.11 (0.10), PLE 0.09 (0.09), PME 0.08 (0.08); intervals AME-AME 0.02 (0.03), AME-ALE 0.03 (0.03), ALE-PLE 0.04 (0.04), PLE-PME 0.06 (0.05), PME-PME 0.09 (0.09); clypeus 0.20(0.18). Length of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: ♂ I 4.14 (1.18 + 0.46 + 1.05 + 0.83 + 0.63)/II 3.86(1.08 + 0.45 + 0.95 + 0.79 + 0.60)/III 3.20 (0.90 + 0.38 + 0.70 + 0.73 + 0.50)/IV 4.10 (1.09 + 0.43 + 1.00 + 0.98 + 0.61); ♀ I 3.88(1.11 + 0.48 + 1.00 + 0.75 + 0.54)/II 3.56 (1.03 + 0.48 + 0.86 + 0.70 + 0.50)/III 2.95 (0.81 + 0.40 + 0.63 + 0.65 + 0.46)/IV 3.84 (1.03 + 0.45 + 0.94 + 0.90 + 0.53).

Description. Male (Holotype). Carapace reddish brown with black cervical flecks, longer than wide (W/L 0.8). Anterior eye row weakly procurved as seen from front. Posterior eye row almost straight as seen from above. AME smallest, one third the diameter of ALE. ALE largest, slightly larger than posterior eyes. AME-AME shorter than AME-ALE, AME-AME/AME-ALE \approx 0.6. PME-PME longer than PLE-PME, PME-PME/PLE-PME \approx 1.6. Ocular area wider than long (W/L 2.0), narrower in front than

behind (behind/front 2.9). Clypeus longer than the length of ocular area (clypeus/ocular area L 1.5). Chelicera reddish brown, promargin of fang furrow with three teeth, retromargin with three teeth and some (right, five; left, four) denticles. Labium reddish brown, wider than long (W/L 1.6), about half as long as maxilla. Sternum light reddish brown, slightly wider than long, truncated in front, pointed between coxae IV. Legs light reddish brown with no annulations. Leg length $1 > 4 > 2 > 3$. Tibia I with 3PVS (1–3), 2PLS (3, 4), 3RVS (1–3). Tibia II with 1PVS (2), 2PLS (2, 3), 3RVS (1–3). Metatarsus I with 3PVS (1–3), 1PLS (2), 3RVS (1–3). Metatarsus II with 3PVS (1–3), 2PLS (2, 4), 3RVS (1–3) and VS. Abdomen gray with several paired pale gray flecks, oval, longer than wide.

Palp (Figs. 21–23): Proportion of each segment to patellar length [femur: patella: tibia: cymbium] = 2.60:1:1.25: 2.90. Patella with a horn-like apophysis. Patellar apophysis with two teeth. Tip of patellar apophysis black.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 24.

Internal genitalia (Fig. 25): 2SPM and 1CD present. Shape of opening small, triangle. 1st spermatheca duct shaped, and border with connecting duct not clear. 1st spermatheca and connecting duct thick, long and S-shaped, and connecting to centro-lateral side of 2nd spermatheca. 2nd spermatheca large, balloon-shaped, present on both sides.

Distribution. Around Biwa Lake; Fukui, Gifu and Shiga

Prefectures. (Fig. 1).

Etymology. The specific name is derived from Biwa Lake.

***Cybaeus echigo* sp. nov.**

[Japanese name: Echigo-namihagumo]

(Figs. 1, 26–32)

Type material. Holotype (♂) and a paratype (♀) FUKUSHIMA PREF. Yama-gun, Nishiaizu-machi, Ôkubo, 19-X-2003, HK & TK.

Other specimens examined. FUKUSHIMA PREF. Yama-gun, Nishiaizu-machi, Ôkubo, 6♂5♀, 19-X-2003, HK & TK. —NIIGATA PREF. Higashikanbara-gun, Aga-machi, Mt. Ôtengu, 3♂6♀, 19-X-2003, HK & TK. —NAGANO PREF. Kamiminouchi-gun, Shinano-machi, Kurohime-kôgen, 4♂5♀, 22-X-1999, HK. Nagano City, Togakushi, Kagami-ike, 2♂3♀, 22-X-1999, HK.

Diagnosis. *Cybaeus echigo* sp. nov. has 2SPM and 1CD in female genitalia and resembles *C. ensu*, *C. kiiensis* and *C. hirosimaensis* in the character state. The present new species and the latter three species also share common characters such as: body color and length, having a patellar apophysis in male palp, and arrangements of spermathecae and connecting ducts in female genitalia. However, the present new species is clearly separated from the others by numbers of teeth (5 for *C. echigo* vs. 3 for *C. ensu* and *C. kiiensis*; 0 for *C. hirosimaensis*) on patellar apophysis in male palp, and size of spermathecae (1st < 2nd for *C. echigo* vs. 1st > 2nd for *C. ensu* and *C. hirosimaensis*; 1st = 2nd for *C. kiiensis*) and shape of connecting duct (Fig. 32 for *C. echigo* vs. Fig. 7 for *C. ensu*; fig. 7, p. 117, Ihara 1993 for *C. hirosimaensis*; Fig. 13 for *C. kiiensis*) in female genitalia.

Measurements of the male holotype and female paratype in parentheses. Body L 3.73 (3.73); carapace L 1.90 (1.93), W 1.35 (1.48); abdomen L 1.83 (1.80), W 1.48 (1.34); sternum L 0.88 (0.88), W 0.90 (0.88); labium L 0.23 (0.25), W 0.29 (0.30). Eyes: diameters AME 0.05 (0.06), ALE 0.11 (0.10), PLE 0.10 (0.09), PME 0.09 (0.10); intervals AME-AME 0.05 (0.04), AME-ALE 0.03 (0.03), ALE-PLE 0.04 (0.04), PLE-PME 0.08 (0.09), PME-PME 0.10 (0.09); clypeus 0.20 (0.21). Length of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: ♂I 5.45(1.53 + 0.63 + 1.35 + 1.13 + 0.83)/II 5.05(1.43 + 0.60 + 1.23 + 1.08 + 0.73)/III 4.18 (1.05 + 0.54 + 0.98 + 1.03 + 0.70)/IV 5.36 (1.40 + 0.55 + 1.30 + 1.34 + 0.78); ♀I 5.01(1.43 + 0.61 + 1.25 + 1.03 + 0.70)/II 4.58 (1.30 + 0.58 + 1.10 + 0.95 + 0.65)/III 3.90 (1.08 + 0.50 + 0.83 + 0.90 + 0.60)/IV 5.08 (1.38 + 0.53 + 1.20 + 1.25 + 0.73).

Description. Male (Holotype). Carapace reddish brown with black cervical flecks, longer than wide (W/L 0.7). Anterior eye row weakly procurved as seen from front. Posterior eye row almost straight as seen from above. AME smallest, nearly a half the diameter of other eyes. ALE largest, slightly larger than posterior eyes. AME-AME longer

than AME-ALE, AME-AME/AME-ALE = 2.0. PME-PME longer than PLE-PME, PME-PME/PLE-PME = 1.3. Ocular area wider than long (W/L 1.4), narrower in front than behind (behind/front 1.9). Clypeus as long as length of ocular area. Chelicera reddish brown, promargin of fang furrow with three teeth, retromargin with three teeth and some (right, three; left, four) denticles. Labium reddish brown, wider than long (W/L 1.2), about half as long as maxilla. Sternum reddish brown, wider than long, truncated in front, pointed between coxae IV. Legs reddish brown, becoming deep brown towards the distal end and with no annulations. Leg length 1 > 4 > 2 > 3. Tibia I with 4PVS (1–4), 2PLS (3, 4), 4RVS (1–4). Tibia II with 3PVS (1–3), 2PLS (2, 3), 3RVS (1, 2, 4). Metatarsus I with 3PVS (1–3), 1PLS (2), 3RVS (1–3), 1RLS. Metatarsus II with 3PVS (1–3), 3PLS (2–4), 3RVS (1–3), 1RLS and VS. Abdomen oval, longer than wide, dark gray, with several paired pale gray flecks.

Palp (Figs. 26–29): Proportion of each segment to patellar length [femur: patella: tibia: cymbium] = 2.46:1:0.97:2.57. Patella with a thumb-like apophysis. Patellar apophysis dorsally with five teeth.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 30.

Internal genitalia (Figs. 31–32): 2SPM and 1CD present. Opening large and equilateral trapezoid. Spermathecae balloon shaped, arranged lengthways. 1st spermatheca smaller than 2nd spermatheca. Connecting duct short, narrow, S-shaped, and connecting lateral side of 1st spermatheca to centro-lateral side of 2nd spermatheca.

Distribution. From northern part of Nagano Pref. to Fukushima Pref. (Fig. 1).

Etymology. The specific name is a noun in apposition, which is derived from the Echigo Mountains.

Remarks. *C. echigo* was simultaneously collected with *C. aizuensis* at the type locality in Fukushima Prefecture.

***Cybaeus aizuensis* sp. nov.**

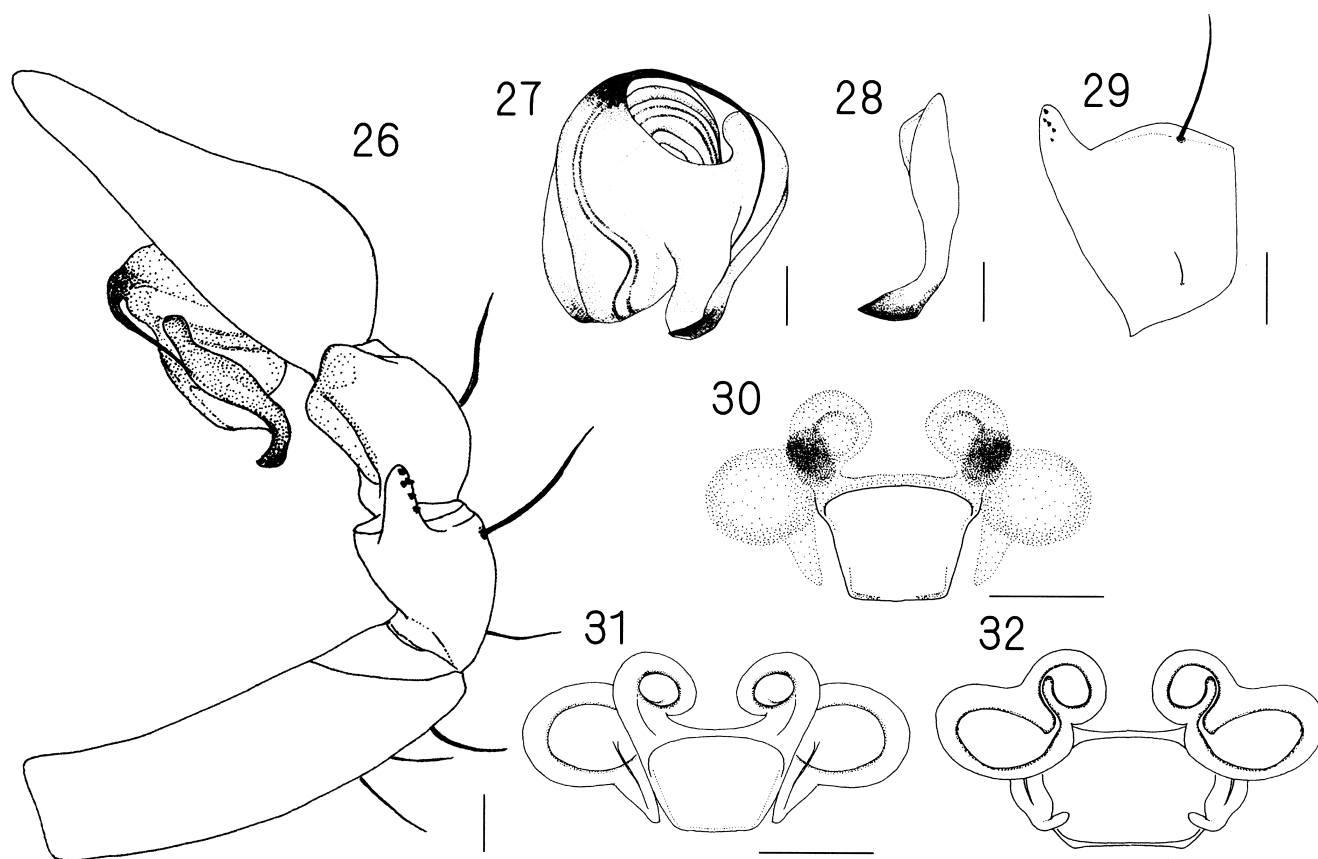
[Japanese name: Aizu-namihagumo]

(Figs. 33–39)

Type material. Holotype (♂) and a paratype (♀) FUKUSHIMA PREF. Yama-gun, Nishiaizu-machi, Ôkubo, 19-X-2003, HK & TK.

Other specimens examined. FUKUSHIMA PREF. Yama-gun, Nishiaizu-machi, Ôkubo, 1♂2♀, 19-X-2003, HK & TK. —NIIGATA PREF. Uonuma City, Nagamatsu, 4♂3♀, 20-X-2003, HK & TK.

Diagnosis. *Cybaeus aizuensis* sp. nov. is characterized by having two patellar apophyses with teeth in male palp. By this diagnostic character, males of the present new species are easily distinguished from other congeners. Females of the present new species have 2SPM and 1CD in genitalia and resemble *C. ensu*, *C. kiiensis* and *C. echigo* in components of genitalia. However, the present new species can be easily identified from the latter by relative size of opening



Figs. 26–32 *Cybaeus echigo* sp. nov. (26–29, male holotype; 30–32, female paratype) 26–29, Left male palp: 26, retrolateral view; 27, apical part of the bulb, ventral view; 28, conductor, lateral view; 29, patella, dorsal view. 30, Female epigynum. 31–32, Female internal genitalia: 31, ventral view; 32, dorsal view. (Scales: 0.1 mm)

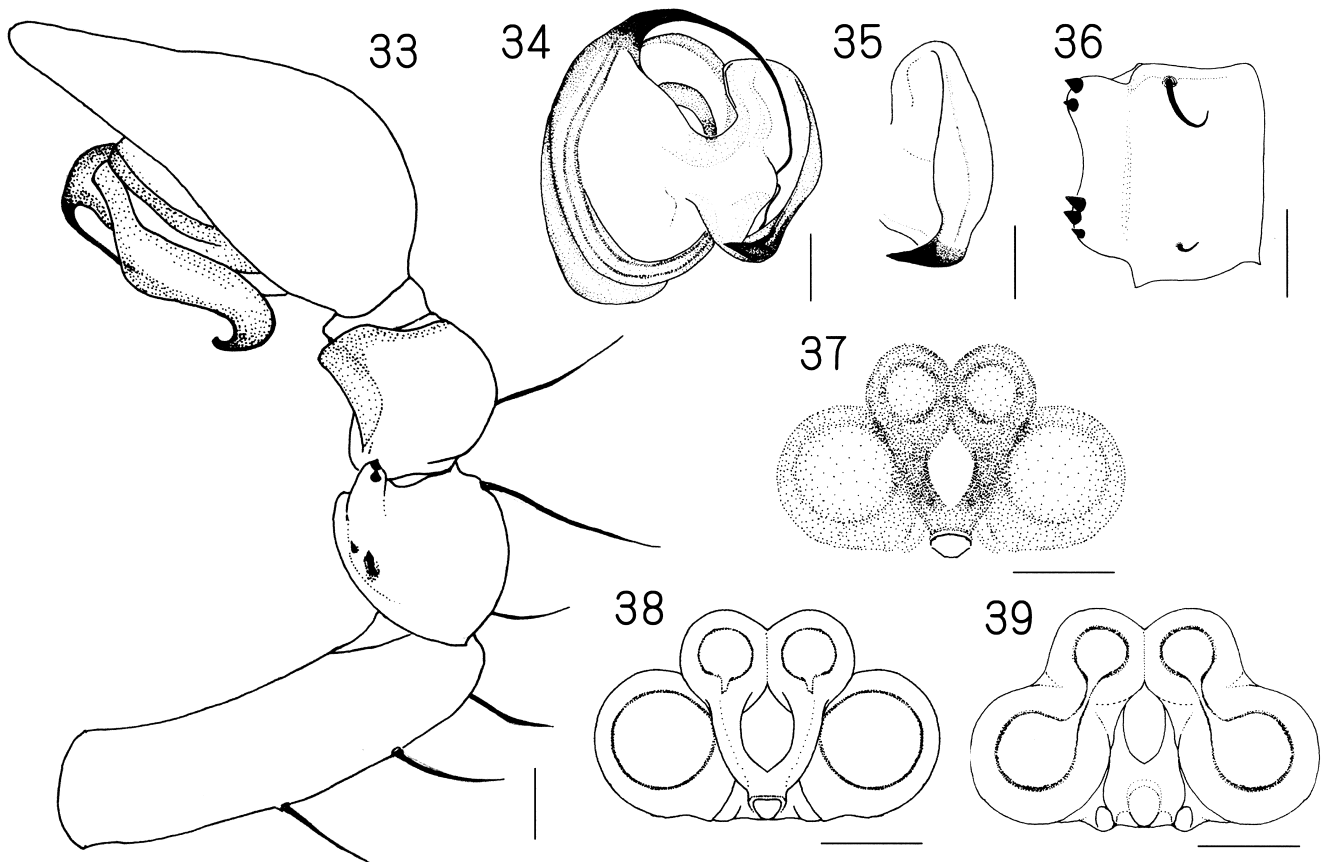
to genitalia (Fig. 37 for *C. aizuensis* vs. Fig. 5 for *C. ensu*; Fig. 11 for *C. kiiensis*; Fig. 30 for *C. echigo*), and shape of connecting duct (Fig. 39 for *C. aizuensis* vs. Fig. 7 for *C. ensu*; Fig. 13 for *C. kiiensis*; Fig. 32 for *C. echigo*) in genitalia.

Measurements of the male holotype and female paratype in parentheses. Body L 3.50 (3.73); carapace L 1.78 (1.55), W 1.28 (1.11); abdomen L 1.73 (2.18), W 1.50 (1.60); sternum L 0.84 (0.75), W 0.83 (0.74); labium L 0.20 (0.20), W 0.28 (0.25). Eyes: diameters AME 0.04 (0.04), ALE 0.10 (0.09), PLE 0.09 (0.08), PME 0.08 (0.08); intervals AME-AME 0.03 (0.03), AME-ALE 0.03 (0.03), ALE-PLE 0.03 (0.03), PLE-PME 0.04 (0.06), PME-PME 0.09 (0.09); clypeus 0.14 (0.14). Length of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: ♂ I 5.00 (1.33 + 0.55 + 1.28 + 1.03 + 0.83)/II 4.65 (1.20 + 0.54 + 1.15 + 0.98 + 0.79)/III 4.18 (1.08 + 0.50 + 0.95 + 0.95 + 0.70)/IV 5.40 (1.38 + 0.53 + 1.30 + 1.35 + 0.85); ♀ I 4.11 (1.14 + 0.50 + 1.05 + 0.78 + 0.65)/II 3.83 (1.05 + 0.48 + 0.93 + 0.75 + 0.63)/III 3.49 (0.93 + 0.45 + 0.78 + 0.75 + 0.59)/IV 4.53 (1.19 + 0.48 + 1.09 + 1.10 + 0.68).

Description. Male (Holotype). Carapace light reddish brown with black cervical flecks, longer than wide (W/L 0.7). Anterior eye row weakly recurved as seen from front.

Posterior eye row weakly recurved as seen from above. AME smallest, nearly one third the diameter of ALE. ALE largest, larger than posterior eyes. AME-AME equal to AME-ALE, AME-AME/AME-ALE \approx 1.0. PME-PME longer than PLE-PME, PME-PME/PLE-PME \approx 2.3. Ocular area wider than long (W/L 1.2), narrower in front than behind (behind/front 2.4). Clypeus shorter than the length of ocular area (clypeus/ocular area L 0.7). Chelicera light reddish brown, promargin of fang furrow with three teeth, retromargin with three teeth and five denticles. Labium light reddish brown, wider than long (W/L 1.4), about half as long as maxilla. Sternum light reddish brown, longer than wide, truncated in front, pointed between coxae IV. Legs light reddish brown, becoming deep brown towards the distal end and with no annulations. Leg length 4 > 1 > 2 > 3. Tibia I with 4PVS (1–4), 2PLS (3, 4), 3RVS (1, 2, 4). Tibia II with 3PVS (1–3), 3PLS (2, 3, 4), 3RVS (1, 2, 4). Metatarsus I with 3PVS (1–3), 1PLS (2), 3RVS (1–3). Metatarsus II with 3PVS (1–3), 4PLS (1–4), 3RVS (1–3), 1RLS and VS. Abdomen oval, longer than wide, light gray, with several paired pale gray flecks.

Palp (Figs. 33–36): Proportion of each segment to patellar length [femur: patella: tibia: cymbium] = 2.60:1:1.07:2.73. Patella with two apophyses. Patellar apophysis distally



Figs. 33–39 *Cybaeus aizuensis* sp. nov. (33–36, male holotype; 37–39, female paratype) 33–36, Left male palp: 33, retrolateral view; 34, apical part of the bulb, ventral view; 35, conductor, lateral view; 36, patella, dorsal view. 37, Female epigynum. 38–39, Female internal genitalia: 38, ventral view; 39, dorsal view. (Scales: 0.1 mm)

with two teeth and proximally with three teeth.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 37.

Internal genitalia (Figs. 38–39): 2SPM and 1CD present. Opening very small and equilateral trapezoid. Spermathecae spherical and arranging lengthways. 1st spermatheca smaller than 2nd spermatheca. Connecting duct short, almost straight, and connecting lower part of 1st spermatheca to upper part of 2nd spermatheca in central side.

Distribution. Niigata and Fukushima Prefectures. (Fig. 1).

Etymology. The specific name is derived from a Japanese local area name, Aizu District.

Remarks. *C. aizuensis* was simultaneously collected with *C. echigo* at the type locality in Fukushima Prefecture.

***Cybaeus gassan* sp. nov.**

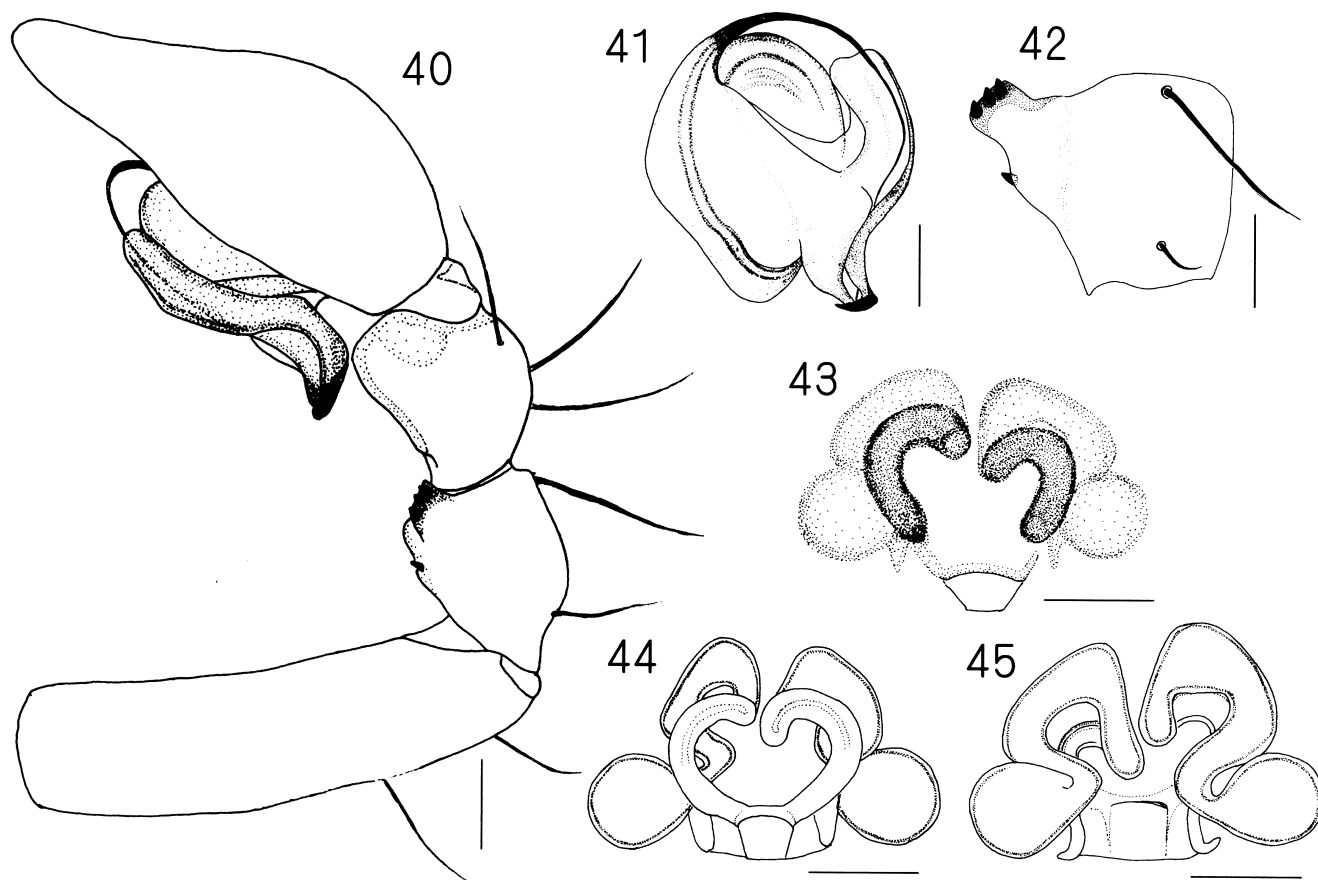
[Japanese name: Gassan-namihagumo]
(Figs. 1, 40–45)

Type material. Holotype (♂) and a paratype (♀) YAMAGATA PREF. Sagae City, Tashiro, 16-IX-2003, HK & TK.

Other specimens examined. YAMAGATA PREF. Sagae City, Tashiro, 1♂4♀, 16-IX-2003, HK & TK. Nishimurayama-gun, Nishikawa-machi: Mt. Nakasaki, 2♀, 16-IX-2003, HK & TK; Shizu, 3♂7♀, 16-IX-2003, HK & TK.

Diagnosis. *Cybaeus gassan* sp. nov. has two clusters of teeth on patellar apophysis in male palp. Only *C. aizuensis* shares this character state. The present new species, however, can be separated from *C. aizuensis* by shape (Fig. 42 for *C. gassan* vs. Fig. 36 for *C. aizuensis*) and teeth number (3+1 for *C. gassan* vs. 2+3 for *C. aizuensis*) of patellar apophysis of male palp. In female, *Cybaeus gassan* possesses characteristic genitalia with 1st spermatheca forming thick ducts. The present new species resembles *C. biwaensis* in this characteristic structure of genitalia. The present new species, however, clearly differs from *C. biwaensis* by the duct shape (Fig. 45 for *C. gassan* vs. Fig. 25 for *C. biwaensis*) in genitalia.

Measurements of the male holotype and female paratype in parentheses. Body L 3.33 (2.88); carapace L 1.65 (1.78), W 1.15 (1.19); abdomen L 1.68 (1.90), W 1.43 (1.45); sternum L 0.83 (0.90), W 0.79 (0.86); labium L 0.23 (0.23), W 0.25 (0.28). Eyes: diameters AME 0.04 (0.04), ALE 0.11 (0.11), PLE 0.08 (0.08), PME 0.08 (0.09); intervals AME-



Figs. 40–45 *Cybaeus gassan* sp. nov. (40–42, male holotype; 43–45, female paratype) 40–42, Left male palp: 40, retrolateral view; 41, apical part of the bulb, ventral view; 42, patella, dorsal view. 43, Female epigynum. 44–45, Female internal genitalia: 44, ventral view; 45, dorsal view. (Scales: 0.1 mm)

AME 0.03 (0.06), AME-ALE 0.02 (0.03), ALE-PLE 0.03 (0.03), PLE-PME 0.04 (0.06), PME-PME 0.09 (0.10); clypeus 0.13 (0.14). Length of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: ♂ I 4.90 (1.30 + 0.50 + 1.28 + 1.03 + 0.80)/II 4.55 (1.25 + 0.49 + 1.11 + 0.95 + 0.75)/III 4.06 (1.09 + 0.45 + 0.93 + 0.93 + 0.68)/IV 5.14 (1.34 + 0.50 + 1.20 + 1.28 + 0.83); ♀ I 4.68 (1.33 + 0.56 + 1.19 + 0.90 + 0.70)/II 4.33 (1.25 + 0.53 + 1.05 + 0.85 + 0.65)/III 3.86 (1.10 + 0.48 + 0.86 + 0.85 + 0.58)/IV 5.03 (1.35 + 0.53 + 1.20 + 1.18 + 0.78).

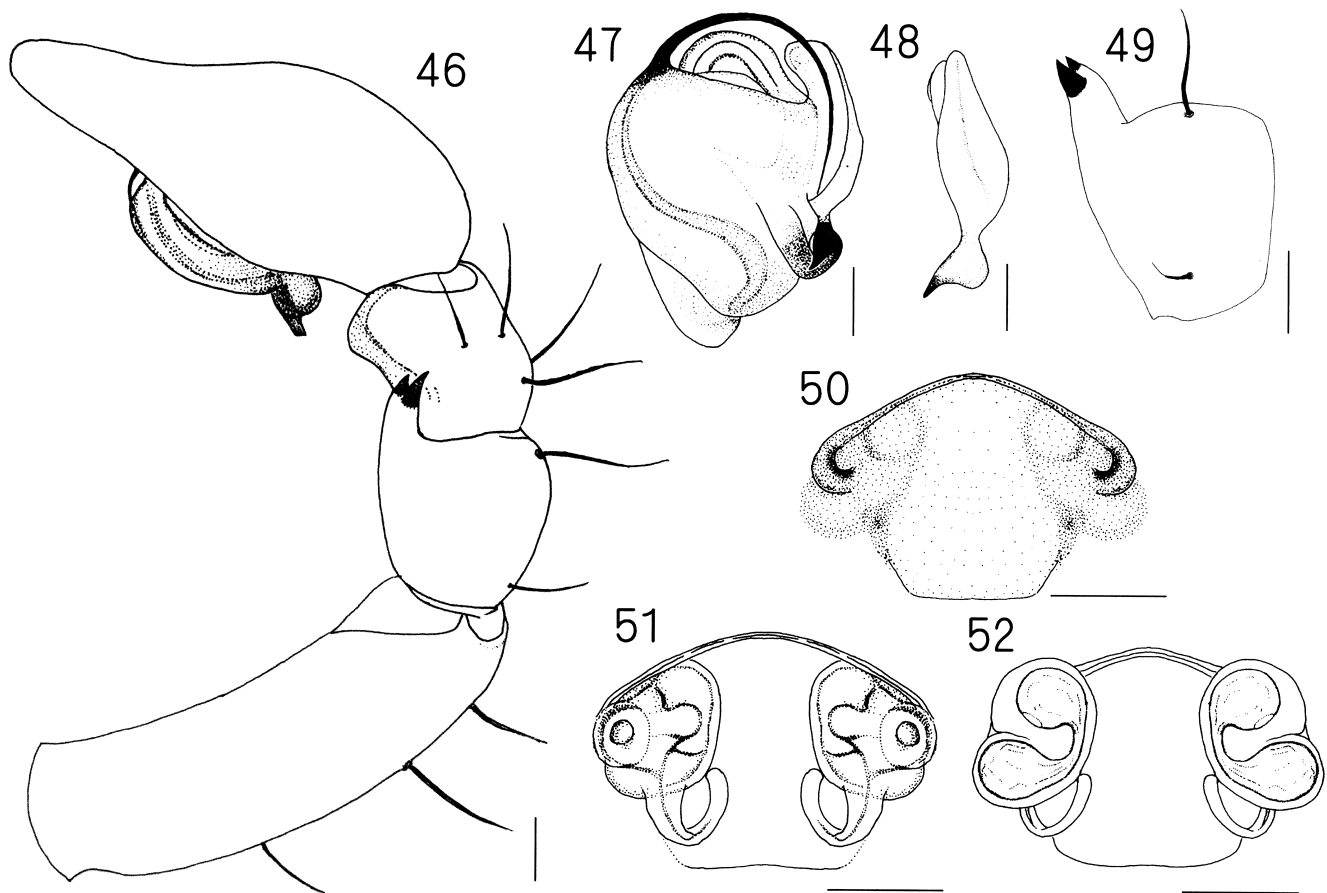
Description. Male (Holotype). Carapace ivory with black cervical flecks, longer than wide (W/L 0.7). Anterior eye row almost straight as seen from front. Posterior eye row weakly procurved as seen from above. AME smallest, nearly a half the diameter of ALE. ALE largest, equal to PLE. AME-AME shorter than AME-ALE, AME-AME/A ME-ALE \approx 0.9. PME-PME longer than PLE-PME, PME-P ME/PLE-PME \approx 1.1. Ocular area wider than long (W/L 1.2), narrower in front than behind (behind/front 2.1). Clypeus shorter than length of ocular area (clypeus/ocular area L 0.8). Chelicera light reddish brown, promargin of fang furrow with three teeth, retromargin with five teeth and some (right, five; left, six) denticles. Labium light reddish brown, wider than long (W/L 1.1), about half as long as

maxilla. Sternum light reddish brown, wider than long, truncated in front, pointed between coxae IV. Legs ivory, becoming deep brown towards the distal end and with no annulations. Leg length $4 > 1 > 2 > 3$. Tibia I with 2PVS(1, 2), 2PLS(3, 4), 2RVS(1, 2). Tibia II with 2PVS(1, 2), 2PLS(2, 3), 2RVS(1, 2). Metatarsus I with 3PVS(1–3), 1PLS(2), 3RVS(1–3) and VS. Metatarsus II with 3PVS(1–3), 2PLS(2, 4), 3RVS(1–3) and VS. Abdomen ivory with no flecks, oval, longer than wide.

Palp (Figs. 40–42): Proportion of each segment to patellar length [femur: patella: tibia: cymbium] = 2.59:1:1.48: 2.96. Patella with an apophysis with two steps. Patellar aspophysis with distomedially with three teeth and medially with one tooth.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 43.

Internal genitalia (Figs. 44–45): 2SPM and 1CD present. Shape of opening small, equilateral trapezoid. 1st spermatheca tube like, and border between the spermatheca and connecting duct not clear. 1st spermatheca and connecting duct long and thick, thicker in dorsal side than in ventral, semicircle-shape on each side, and connecting to centro-lateral side of 2nd spermatheca. 2nd spermatheca



Figs. 46–52 *Cybaeus asahi* sp. nov. (46–49, male holotype; 50–52, female paratype) 46–49, Left male palp: 46, retrolateral view; 47, apical part of the bulb, ventral view; 48, conductor, lateral view; 49, patella, dorsal view. 50, Female epigynum. 51–52, Female internal genitalia: 51, ventral view; 52, dorsal view. (Scales: 0.1 mm)

balloon-shaped, existing on both sides.

Distribution. Yamagata Pref. (Fig. 1).

Etymology. The specific name is derived from Mt. Gassan, which is the highest peak of the distributional range of the species.

Remarks. *C. gassan* was simultaneously collected with *C. asahi* at a site on Mt. Nakasaki.

***Cybaeus asahi* sp. nov.**

[Japanese name: Asahi-namihagumo]
(Figs. 1, 46–52)

Type material. Holotype (♂) and a paratype (♀) YAMAGATA PREF. Nishimurayama-gun, Nishikawa-machi, Mt. Nakasaki, 16-IX-2003, HK & TK.

Other specimens examined. YAMAGATA PREF. Nishimurayama-gun, Nishikawa-machi: Mt. Nakasaki, 4♀, 16-IX-2003, HK & TK; Nekogawa, 2♂4♀, 16-IX-2003, HK & TK.

Diagnosis. In most species of *Cybaeus*, an epigynum bears an opening at posterior side. *Cybaeus asahi* sp. nov., however, possesses an epigynum with two openings at both

lateral sides and easily separated from most of the congeners by epigynum. The present new species resembles *C. echigo*, *C. aizuensis* and *C. nojimai* in body color and length, having a patellar apophysis in male palp, and components in female genitalia. However, the present new species differs from the latter in shape (Fig. 49 for *C. asahi* vs. Fig. 29 for *C. echigo*; Fig. 36 for *C. aizuensis*; fig. 19, p. 124, Ihara 1993 for *C. nojimai*) and teeth numbers (2 for *C. asahi* vs. 5 for *C. echigo*; 2+3 for *C. aizuensis*; 0 for *C. nojimai*) of patellar apophysis in male palp, and size of spermathecae (1st = 2nd for *C. asahi* vs. 1st < 2nd for *C. echigo* and *C. aizuensis*; 1st = 2nd for *C. nojimai*) in female genitalia.

Measurements of the male holotype and female paratype in parentheses. Body L 2.95 (2.88); carapace L 1.78 (1.80), W 1.30 (1.30); abdomen L 1.63 (2.23), W 1.03 (1.64); sternum L 0.80 (0.80), W 0.83 (0.85); labium L 0.20 (0.21), W 0.28 (0.30). Eyes: diameters AME 0.05 (0.05), ALE 0.12 (0.13), PLE 0.10 (0.10), PME 0.09 (0.08); intervals AME-AME 0.03 (0.03), AME-ALE 0.03 (0.03), ALE-PLE 0.03 (0.03), PLE-PME 0.06 (0.07), PME-PME 0.09 (0.12); clypeus 0.20 (0.21). Length of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: ♂I 4.88 (1.34 + 0.55 +

1.26+1.00+0.73)/II 4.58(1.28+0.53+1.14+0.95+0.69)/
III 3.93 (1.08+0.48+0.88+0.90+0.60)/IV 4.85 (1.25+
0.50+1.20+1.18+0.73); ♀I 4.56(1.31+0.55+1.20+0.88
+0.63)/II 4.24 (1.20+0.53+1.06+0.86+0.59)/III 3.70
(1.03+0.48+0.80+0.84+0.56)/IV 4.53(1.23+0.50+1.08
+1.10+0.63).

Description. Male (Holotype). Carapace reddish brown with black cervical flecks, longer than wide (W/L 0.7). Anterior eye row almost straight as seen from front. Posterior eye row weakly recurved as seen from above. AME smallest, nearly a half the diameter of other eyes. ALE largest, slightly larger than PLE. AME-AME as long as AME-ALE, AME-AME/AME-ALE \approx 1.0. PME-PME longer than PLE-PME, PME-PME/PLE-PME \approx 1.5. Ocular area wider than long (W/L 1.3), narrower in front than behind (behind/front 2.2). Clypeus as long as length of ocular area (clypeus/ocular area L 1.0). Chelicera reddish brown, promargin of fang furrow with three teeth, retromargin with three teeth and some (right, four; left, three) denticles. Labium reddish brown, wider than long (W/L 1.4), about half as long as maxilla. Sternum reddish brown, wider than long, truncated in front, pointed between coxae IV. Legs reddish brown, becoming deep brown towards the distal end and with no annulations. Leg length 1>4>2>3. Tibia I with 4PVS (1-4), 2PLS (3, 4), 4RVS (1-4). Tibia II with 3PVS (1-3), 2PLS (2, 3), 4RVS (1-4). Metatarsus I with 3PVS (1-3), 1PLS (2), 3RVS (1-3), 1RLS. Metatarsus II with 3PVS (1-3), 3PLS (2-4), 3RVS (1-3), 1RLS and VS. Abdomen oval, longer than wide, gray, with no flecks.

Palp (Figs. 46-49): Proportion of each segment to patellar length [femur: patella: tibia: cymbium]=2.31:1:0.81:2.44. Patella with a thumb-like apophysis. Patellar apophysis with two teeth, the dorsal tooth larger than the ventral tooth.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 50.

Internal genitalia (Figs. 51-52): 2SPM and 1CD present. Epigynum with two openings at both lateral sides. Spermathecae spherical shape and arranging lengthways. 1st spermatheca as large as 2nd spermatheca. Connecting duct short and connecting 1st spermatheca to 2nd spermatheca in centro-lateral side.

Distribution. Yamagata Pref. (Fig. 1).

Etymology. The specific name is derived from Asahi Mountains.

Remarks. *C. asahi* was simultaneously collected with *C. gassan* at the type locality in Yamagata Prefecture.

***Cybaeus melanoparvus* sp. nov.**

[Japanese name: Kuroko-namihagumo]
(Figs. 1, 53-57)

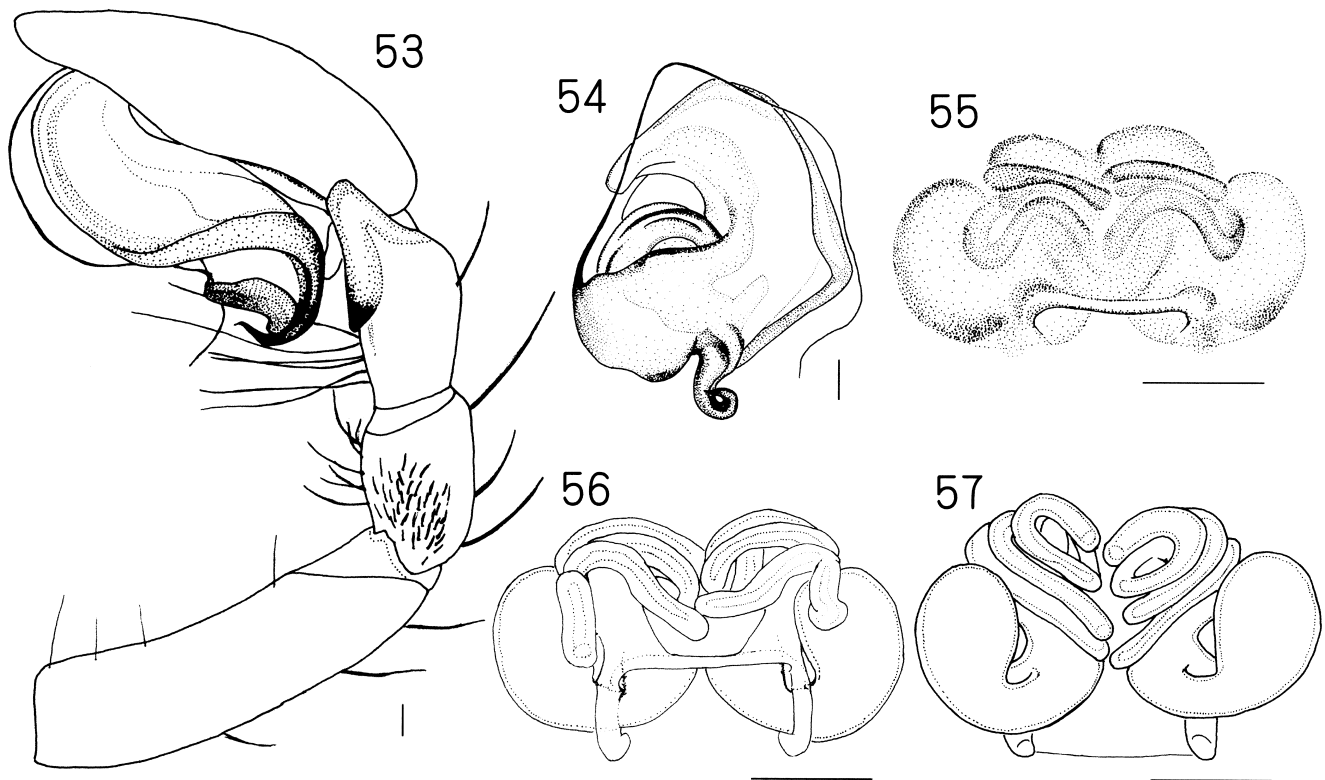
Type material. Holotype (♂) GIFU PREF. Ôgaki City, Kamiishizu-cho, Tokiyama, 25-XI-1995, HK. Paratype (♀) GIFU PREF. Yamagata City, Kusaki, 4-XI-2001, HK.

Other specimens examined. FUKUI PREF. Ôno City: Shimo-ôno, 2♀, 15-V-2004, HK.; Shimo-uchinami, 1♀, 15-V-2004, HK. —NAGANO PREF. Kiso-gun, Nagiso-machi, Ôdaira Pass, 1♂5♀, 31-X-1998, HK. —GIFU PREF. Nakatsugawa City, Kashimo, Tsukechi-kyo, 2♀, 13-IV-1996, HK. Gujô City, Minami-cho, Mt. Fukubegatake, 3♂3♀, 26-IX-1998, HK. Yamagata City, Kusaki, 3♀, 4-XI-2001, HK. Motosu City: Neo-matsuda, 4♂4♀, 25-XI-2000, HK; Neo-nogo, 1♂, 27-X-2001, HK; Neo-okutani, 1♀, 4-XI-2001, HK. Ôgaki City, Kami-ishizu-cho, Tokiyama, 3♀, 25-XI-1995, HK. Fuwa-gun, Sekigahara-cho, Imasu, 4♂, 15-XI-1998, HK.

Diagnosis. *Cybaeus melanoparvus* sp. nov. is easily diagnosed by having a highly developed conductor in male palp, and a pair of very long ducts and large spermathecae in female genitalia. Only *C. reticulatus* Simon 1886 from North America resembles this species in the female epigynum (judging from figs. 40-42, p. 41, Chamberlin & Ivie 1932). The present new species, however, is distinguished from the latter in body length (♂ ca. 4.2, ♀ ca. 3.9 for *C. melanoparvus* vs. ♂ ca. 8.0, ♀ ca. 9.2 for *C. reticulatus*) and existence of patellar apophysis (absent in *C. melanoparvus* vs. present in *C. reticulatus*) in male palp.

Measurements of the male holotype and female paratype in parentheses. Body L 4.20(3.85); carapace L 2.23 (1.93), W 1.60 (1.31); abdomen L 1.98 (1.93), W 1.73 (1.40); sternum L 1.03 (0.88), W 1.03 (0.88); labium L 0.22 (0.23), W 0.35 (0.32). Eyes: diameters AME 0.08 (0.05), ALE 0.14 (0.13), PLE 0.13 (0.11), PME 0.11 (0.11); intervals AME-AME 0.04 (0.05), AME-ALE 0.03 (0.04), ALE-PLE 0.05 (0.04), PLE-PME 0.07 (0.09), PME-PME 0.11 (0.13); clypeus 0.18(0.17). Length of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: ♂I 6.66 (1.83+0.70+1.75+1.48+0.91)/II 6.25(1.70+0.70+1.55+1.40+0.90)/III 5.65 (1.53+0.63+1.20+1.33+0.98)/IV 7.04 (1.88+0.68+1.70+1.83+0.96); ♀I 4.95 (1.38+0.60+1.30+1.03+0.65)/II 4.56 (1.33+0.58+1.13+0.95+0.59)/III 3.95 (1.10+0.55+0.85+0.90+0.55)/IV 5.04 (1.38+0.55+1.21+1.24+0.66).

Description. Male (Holotype). Carapace yellowish brown with black cervical and radial flecks, slightly wider than long (W/L 0.7). Anterior eye row almost straight as seen from front. Posterior eye row weakly procurved as seen from above. AME smallest, a half the diameter of ALE. ALE largest, slightly larger than PLE. AME-AME longer than AME-ALE, AME-AME/AME-ALE \approx 1.5. PME-PME longer than PLE-PME, PME-PME/PLE-PME \approx 1.6. Ocular area longer than wide (W/L 1.7), narrower in front than behind (behind/front 1.7). Clypeus shorter than the length of ocular area (clypeus/ocular area L 0.8). Chelicera reddish brown, promargin of fang furrow with three teeth, retromargin with five teeth and four denticles. Labium reddish brown, wider than long (W/L 1.6), about half as long as maxilla. Sternum yellowish brown, as long as wide, truncated in front, pointed between coxae IV. Legs yellowish brown, femur, tibia and metatarsus with two annulations.



Figs. 53–57 *Cybaeus melanoparvus* sp. nov. (53–54, male holotype; 55–57, female paratype) 53–54, Left male palp: 53, retrolateral view; 54, apical part of the bulb, ventral view. 55, Female epigynum. 56–57, Female internal genitalia: 56, ventral view; 57, dorsal view. (Scales: 0.1 mm)

Femoral annulations existing in ventral side. Leg length $4 > 1 > 2 > 3$. Tibia I with 3PVS (1–3), 2PLS (3, 4), 3RVS (1–3). Tibia II with 3PVS (1, 2, between 1 and 2), 4PLS (1–4), 3RVS (1–3). Metatarsus I with 3PVS (1–3), 2PLS (2, 4), 3RVS (1–3), 1RLS. Metatarsus II with 3PVS (1–3), 4PLS (1–4), 3RVS (1–3), 2RLS (1, 4). Abdomen oval, longer than wide, black, with several paired pale gray flecks.

Palp (Figs. 53–54): Proportion of each segment to patella length [femur: patella: tibia: cymbium] = 2.06:1:1:2.29. Patella with no apophysis. Tibial apophysis sharply squarish. Conductor very large, hanging out of cymbium.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 55.

Internal genitalia (Figs. 56–57): Only 1SPM present. Shape of opening equilateral trapezoid. Anterior duct thin, long, dorsally coil-shaped, complicatedly convoluted, and getting thick towards spermatheca. Spermathecae large, balloon-shaped.

Distribution. Gifu and Mie Prefectures. (Fig. 1).

Etymology. The specific name is Latin meaning black and small derived from characteristic body color and size of the species.

Remarks. Distributional range of *C. melanoparvus* overlaps with *C. minoensis* (Fig. 1).

***Cybaeus monticolus* sp. nov.**

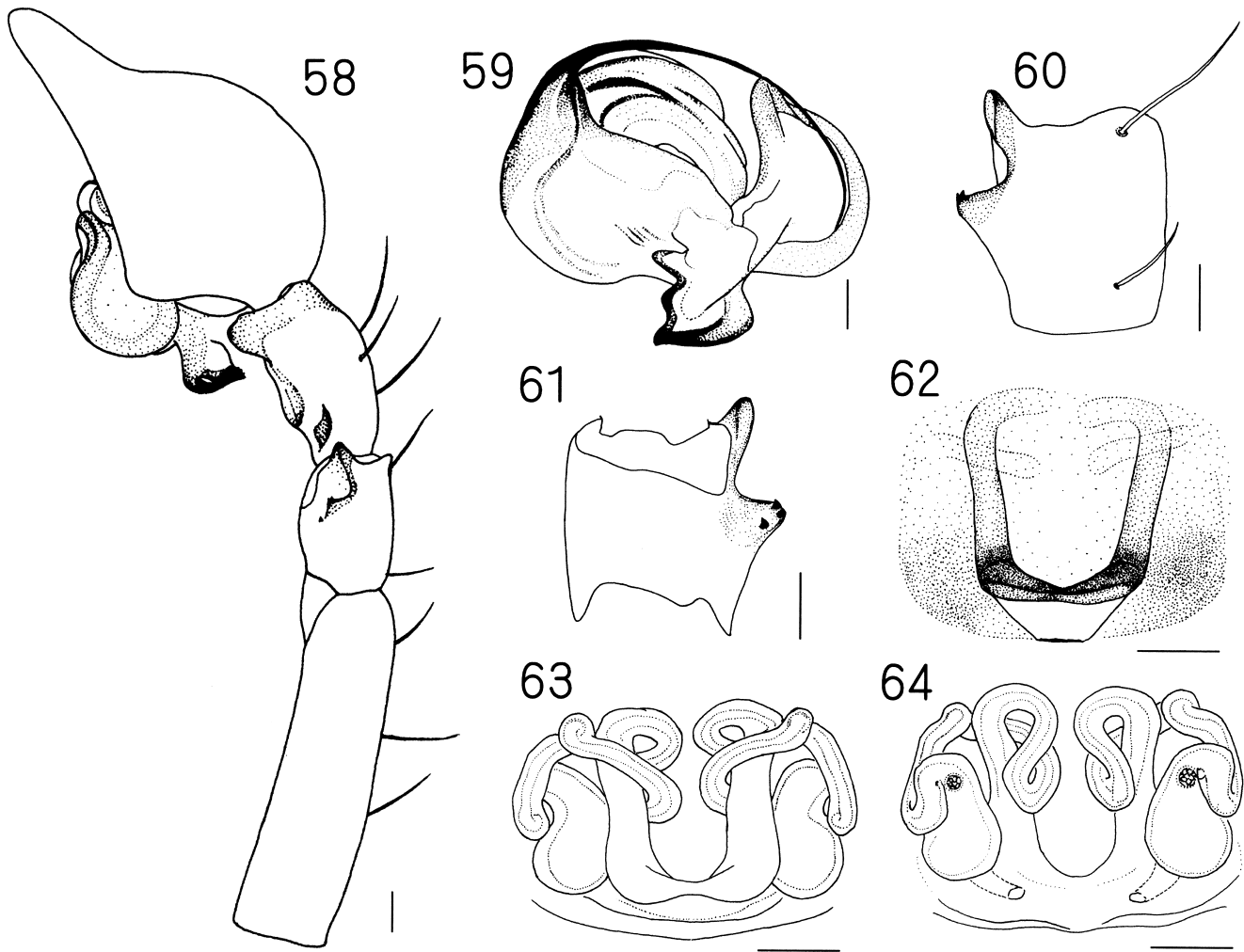
[Japanese name: Miyama-namihagumo]

(Figs. 1, 58–64)

Type material. Holotype (♂) and a paratype (♀) NAGANO PREF. Iida City, Kami-mura, Hodono, 23-VII-1995, HK.

Other specimens examined. YAMANASHI PREF. Minamitsuru-gun: Yamanakako-mura, Mitsu Pass, 2♀, 17-XI-1978, HK; Fujikawaguchiko-machi, Mt. Ômuro, 1♂, 14-VII-1995, HK. —NAGANO PREF. Iida City, Kami-mura, Shirabiso-kôgen, 4♂1♀, 23-VII-1995, HK. Kiso-gun, Nagiso-machi: Kudaridani, 1♀, 10-V-1997, HK; Ôdaira Pass, 1♀, 31-X-1998, HK. Shimoina-gun, Achi-mura, Namiai, Samubara Pass, 2♂1♀, 27-VI-1998, HK. —SHIZU OKA PREF. Fujinomiya City: Fumoto, 1♀, 14-V-1978, HK; Mt. Fuji, 2♂3♀, 14-VII-1995, HK. Shizuoka City: Fujimi Pass, 1♀, 3-XI-1975, HK; Abe Pass, 5♀, 13-X-1978, HK; Umegashima Spa, 1♀, 11-VIII-1976, HK. —AICHI PREF.: Kitashitara-gun, Toyone-mura, Mt. Chausu, 1♂3♀, 22-VII-1996, HK.

Diagnosis. *Cybaeus monticolus* sp. nov. can be distinguished from most of congeners by having a very distinctive set of characters, 1SPM and a long anterior duct in female genitalia. The present new species resembles *C. striatipes* Bösenberg & Strand 1906 and *C. melanoparvus* in the components of genitalia (judging from figs. 4–5, p. 40, Ono



Figs. 58–64 *Cybaeus monticolus* sp. nov. (58–61, male holotype; 62–64, female paratype) 58–61, Left male palp: 58, retrolateral view; 59, apical part of the bulb, ventral view; 60, patella, dorsal view; 61, patella, ventral view. 62, Female epigynum. 63–64, Female internal genitalia: 63, ventral view; 64, dorsal view. (Scales: 0.1 mm)

1981). But, the present new species differs from the latter not only in body color (ivory for *C. monticolus* vs. brown for *C. striatipes*) and length (σ ca. 5.2 for *C. monticolus* vs. σ ca. 9.8 for *C. striatipes*) but also duct shape (Figs. 56–57 for *C. monticolus* vs. figs. 4–5, p. 40, Ono 1981 for *C. striatipes*) in female genitalia. In male, the present new species and *C. melanoparvus* are clearly distinguishable by shape of patellar apophysis and conductor.

Measurements of the male holotype and female paratype in parentheses. Body L 4.60 (5.24); carapace L 2.13 (2.08), W 1.55 (1.48); abdomen L 2.48 (3.17), W 2.05 (2.38); sternum L 1.10 (1.05), W 1.00 (0.88); labium L 0.30 (0.30), W 0.32 (0.32). Eyes: diameters AME 0.05 (0.04), ALE 0.11 (0.10), PLE 0.11 (0.11), PME 0.09 (0.09); intervals AME-AME 0.04 (0.05), AME-ALE 0.05 (0.05), ALE-PLE 0.05 (0.06), PLE-PME 0.08 (0.08), PME-PME 0.09 (0.12); clypeus 0.20 (0.18). Length of legs [total length (femur + patella + tibia + metatarsus + tarsus)]: σ I 7.26 (1.90 + 0.68 + 1.88 + 1.53 + 1.29)/II 6.85 (1.88 + 0.68 + 1.66 + 1.48 + 1.16)/III 6.23 (1.65 + 0.64 + 1.44 + 1.48 + 1.03)/IV 8.03 (2.13 +

0.68 + 2.00 + 1.98 + 1.25); σ I 6.43 (1.78 + 0.68 + 1.65 + 1.30 + 1.03)/II 5.95 (1.66 + 0.64 + 1.45 + 1.25 + 0.95)/III 5.43 (1.48 + 0.60 + 1.25 + 1.25 + 0.85)/IV 7.01 (1.88 + 0.66 + 1.75 + 1.73 + 1.00).

Description. Male (Holotype). Carapace ivory with black cervical flecks, longer than wide (W/L 0.7). Anterior eye row almost straight as seen from front. Posterior eye row weakly procurved as seen from above. AME smallest, nearly a half the diameter of ALE. ALE largest, equal to PLE. AME-AME shorter than AME-ALE, AME-AME/ALE-AME \approx 0.9. PME-PME longer than PLE-PME, PME-PME/PLE-PME \approx 1.1. Ocular area wider than long (W/L 1.2), narrower in front than behind (behind/front 2.1). Clypeus shorter than length of ocular area (clypeus/ocular area L 0.8). Chelicera light reddish brown, promargin of fang furrow with three teeth, retromargin with five teeth and some (right, five; left, six) denticles. Labium light reddish brown, wider than long (W/L 1.1), about half as long as maxilla. Sternum light reddish brown, wider than long, truncated in front, pointed between coxae IV. Legs ivory,

becoming deep brown towards the distal end and with no annulations. Leg length $4 > 1 > 2 > 3$. Tibia I with 2PVS (1, 2), 2PLS (3, 4), 2RVS (1, 2). Tibia II with 2PVS (1, 2), 2PLS (2, 3), 2RVS (1, 2). Metatarsus I with 3PVS (1–3), 1PLS (2), 3RVS (1–3) and VS. Metatarsus II with 3PVS (1–3), 2PLS (2, 4), 3RVS (1–3) and VS. Abdomen ivory with no flecks, oval, longer than wide.

Palp (Figs. 58–61): Proportion of each segment to patellar length [femur: patella: tibia: cymbium] = 2.59:1:1.48:2.96. Patella with two apophyses. Upper patellar apophysis with no tooth, lower patellar apophysis dish-like and with several (right, four; left, three) teeth.

Female (Paratype). Legs shorter than those of male. Other features almost same as those of male. Epigynum as shown in Fig. 62.

Internal genitalia (Figs. 63, 64): Only 1SPM present. Shape of opening equilateral trapezoid. Anterior duct long, complicatedly reeled, and connecting to 1st spermatheca. 1st spermatheca existing in both lateral sides of the opening.

Distribution. Southern part of the Akaishi Mountains and around Mt. Fuji. (Fig. 1).

Etymology. The specific name is from the Latin meaning “living in mountains” derived from their habitats.

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